

FIVE HUNDRED HOURS

Remarkable Endurance Test of Bristol Theseus Turboprop

HISTORY was made at Filton when, on July 13th, a Bristol Theseus turboprop unit on a test stand was stopped for the last time. By then it had completed a "sealed" endurance test in the course of which it had run for a total of 500 hours under the independent control of and observation by representatives of the Air Registration Board. This very remarkable feat demonstrates the reliability which this particular unit has already achieved, and serves as an indication of the low maintenance cost which gas turbines may be expected to incur when put into service.

On July 8th we recorded the "half-time score" of the Theseus test. At the end of the first 250 hours, temperatures and pressures were normal, and the fuel consumption was of the order of 0.65 lb/b.h.p./hr at full power and 0.70lb/b.h.p./hr. at 75 per cent power.

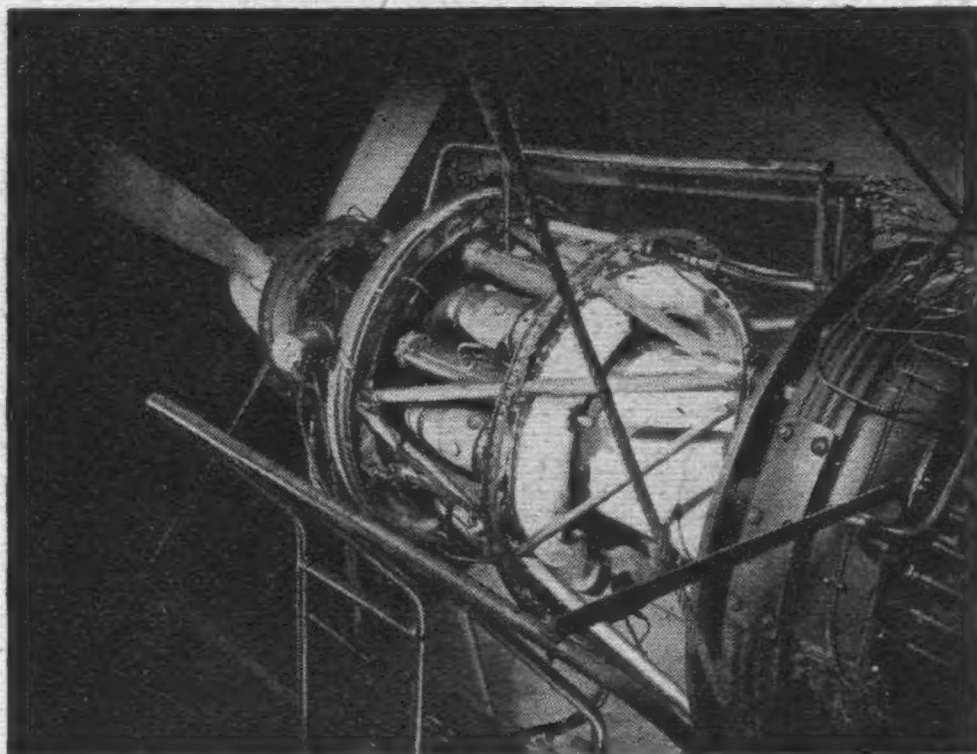
The test began on June 19th and covered a total lapsed time of 567½ hours, of which the engine was running for 500 hours and scheduled stops accounted for 60½ hours. The conditions of the test were such as to preclude any servicing beyond the minimum inspection requirements.

Some idea of the strenuous nature of the test may be formed from the following data. The total of 500 hours comprised 34 periods of 5 hours' duration and 33 periods of 10 hours' duration. These periods were made up as follows:—

5 hours at take-off power	2,250
50 hours at max. continuous power ..	1,675
100 hours at 70 per cent of t.o. power ..	1,560
100 hours at 65 per cent of t.o. power ..	1,450
Total b.h.p.	



FLIGHT DEVELOPMENT: This photograph of a Theseus installed as an outboard power unit of an Avro Lincoln shows its excellent lines when close cowed.



SPOTLIGHT ON RELIABILITY: The Bristol Theseus photographed during one of the stop periods in its 500 hr. run.

	Total b.h.p
100 hours at 60 per cent of t.o. power ..	1,340
100 hours at 55 per cent of t.o. power ..	1,230
45 hours of miscellaneous running, including 67 starts (hot and cold) and 1,000 accelerations.	

Between successive 5- and 10-hour cycles, the engine was shut down for a period of not less than two hours to give a cold start for the next cycle, and for not more than 15 minutes to give a hot start. In all there were 25 two-hour stops and 41 stops of 15 minutes maximum. All maintenance was completed within the scheduled stop periods, and they merely comprised visual inspections, with burner spray nozzles cleaned at each 100 hours and igniter plugs changed at each 150 hours. Two sets of igniter plugs were used, the intention being to clean one set while the other set was in use. Actually, although the plugs were inspected, no cleaning was necessary.

During the whole 500 hours, the only component which had to be replaced was a starter motor, which was changed during the scheduled stop at 315 hours. The motor had made 160 starts and had already seen considerable service before the test was begun.

Throughout the whole test the engine gave no trouble whatever. It ran night and day, with two shifts of testing personnel, and was running for 10 hours out of every 11. A noteworthy feature of the test was the consistent power developed. The maximum power, for instance, was within 20 h.p. of the average over the full 500 hours. Fuel consumption at take-off averaged 0.85 lb/total b.h.p./hr. The oil consumption was negligible, averaging 0.25 pints per hour at the beginning and dropping gradually to give a final average of 0.2 pints per hour. The total quantity of oil used during the test was only 12 gallons.

For the endurance test a Rotol airscrew specially designed for the Theseus was used. It is a four-blader with duralumin blades and of 13ft diameter. Much attention has been paid to weight reduction, and the airscrew weighs only 377 lb, or 0.17 lb/h.p. based on take-off power. The airscrew had previously passed a 100-hr type-approval test on the Theseus.